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EXHIBIT 1

Declaration of Dr. Susan Freier

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CURRICULUM VITAE

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Executive Director Antisense Lead Identification
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EDUCATION:

University of California, Berkeley, California
Ph.D in Chemistry, 1976

Carleton College, Northfield, Minnesota
B.A. in Mathematics, summa cum laude, 1972

AWARDS:

Damon Runyon-Walter Winchell Cancer Fund
Fellow (1976-1978)
California Regents Fellow (1974-1976)
NSF Graduate Trainee (1972-1973)

OTHER:

Served on Genome Study Section NIH 1997-2002,
Chair 2000-2002

EXPERIENCE:

ISIS
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1990-present

Current title: *Executive Director Antisense Lead Identification*

- Determination of microRNA function in mammals. Includes computational identification of miRNAs and miRNA targets. Functional genomics to characterize miRNA biology and identify therapeutic applications of modulation of miRNA activity.
- Use of antisense oligonucleotides for functional genomics of novel targets. Includes: Computational genomics to characterize target RNAs and their variants, rapid throughput screening to identify active antisense oligonucleotides for novel targets, Q-RT-PCR and microarrays for expression analysis.
- Identification and characterization of novel mechanisms for antisense oligonucleotides. Includes computational genomics to identify mRNA variants, alteration of RNA processing, evaluation of siRNA and miRNA mechanisms.
- Biophysical and biochemical evaluation of novel antisense oligonucleotides. Includes: thermodynamics and kinetics of hybridization to oligonucleotide and large structured targets, evaluation of biochemical properties novel

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oligonucleotides, characterization of antisense activity in cell assays, protein-oligonucleotide binding.

- Characterization and screening of combinatorial libraries. Includes: theoretical and experimental evaluation of strategies for deconvolution, high throughput screening of combinatorial libraries, bacterial RNA-protein interactions.
- Development of non-radioactive DNA oligonucleotide probe based tests for detection of infectious and genetic diseases. Experience in: isolation of DNA from clinical samples, probe design, hybridization optimization, assay simplification, process validation. Includes: development of FDA cleared clinical tests for the direct detection of rotavirus or *Campylobacter* in stool, development of colony filter tests for bacterial identification and *in situ* hybridization tests for detection of virus in fixed tissues, cultured cells or patient specimens.
- Postdoctoral research with Douglas H. Turner on nucleic acid structure and dynamics. Experience in: chemical and enzymatic synthesis of oligonucleotides (deoxy- and ribo-), hybridization thermodynamics and kinetics, development of a laser temperature jump apparatus, NMR spectroscopy, computer programming and interfacing to laboratory instruments.
- Postdoctoral research with Irving M. Klotz and Richard P. Van Duyne on resonance Raman spectroscopy of DNA-mutagen interactions and resonance Raman spectroscopy of hemerythrin. Experience in: protein isolation, laser Raman spectroscopy.
- Graduate research on the solution conformation of transfer RNA.
Thesis title: Studies of Nucleic Acid Chemistry:
Part I. The Solution Structure of Yeast Initiator Transfer RNA Studied by Oligonucleotide Binding
Part II. A Chemical Model of Mutagenesis
Experience in: isolation of tRNA, oligoribonucleotide synthesis, oligonucleotide hybridization, NMR spectroscopy.
Research Advisor: Ignacio Tinoco Jr.

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PUBLICATIONS

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Barry M. Casper, Susan M. Freier and David Van Atta, "Time Evolution in Statistical Mechanics", *American Journal of Physics* **41**, 1358-1360 (1973).

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Joseph A. Walder, Roxanne Y. Walder, Michael J. Heller, Susan M. Freier, Robert L. Letsinger and Irving M. Klotz, "Complementary Carrier Peptide Synthesis: General Strategy and Implications for Prebiotic Origin of Peptide Synthesis", *Proc. Nat. Acad. Sci. U.S.A.* **76**, 51-55 (1979).

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Timothy A. Vickers, Michael C. Griffith, Kanda Ramasamy, Lisa M. Risen and Susan M. Freier, "Inhibition of NF- κ B specific transcriptional activation by PNA strand invasion", *Nucleic Acids Res.*, **23**, 3003-3008 (1995).

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